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"MEMBERS ONE OF ANOTHER"

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EVER since the beginning of the war in Europe, the rest of the world has seen what marvels the cooperation of practically all citizens can accomplish at least in the matter of man's control of his environment. The significance of this, I believe, is not far to seek. It lies in the strong probability that man has evolved not so much as an isolated individual as a part of a greater organized group which the Germans worship as the state, but which I feel inclined to call simply the human association in order not to prejudice my cause before getting under way. When we say that man or the horse or the lobster has evolved, we ordinarily think of the evolution of the individual man or horse or lobster. But, while you and I have been evolving, there has been going on another kind of evolution, less obvious, but quite as important. The evolution of the whole body means the evolution of cells and organs, but the cells have been evolving in order to perfect the individual and fit it more completely to its environment. The individual organs lose their independence but the society of cells and organs is better fitted to survive. You and I have been the objects which are fitted to survive in the struggle for existence and not our eyes and teeth and stomachs. But, as we shall see later, in some cases it is evident that the individual animal has not been the unit which has been best adapted to its environment, but a group of individuals which survives in competition with other groups. The association of animals may be the evolutionary unit quite as truly as the individual; in the same way that the individual body is the evolutionary unit rather than the specialized organs and cells making it up. The question I would raise, then, at the outset, is, has man evolved as an individual or as a part of an association? Are we "members one of another," as the Apostle Paul seemed to think, or are we individuals having no relation to our fellows and answerable to no one, after the fashion of Nietzsche's supermen?

The problem is readily seen to be far-reaching. Its bearing upon our social and political organization, religious beliefs and moral code is intimate. In the light of human evolution, is humanity destined to become more closely socialized or less so, is individual effort to become more or less individual in its returns, are national boundaries to hem their citizens in more tightly or are boundaries to break down eventually? It would be manifestly impossible within the scope of a single paper to touch upon these far-reaching problems. I would attempt

something far less comprehensive and simply point out some of the traits of man's immediate ancestors and what seems to me to be one of the most important factors which have brought about his evolution.

Before considering the evolution of the human race, one or two phases of the general phenomena of evolution must be discussed, for without this explanation the more specific problem of man's evolution will not be so clear. Evolution results in greater adaptation to environment, in bringing the individual into a more intimate relation with the world outside itself, or in giving it more abundant life. Adaptation, or fitness for a particular niche in nature, has been the end of evolution, for extinction has been the fate of those forms which do not fit into their place in the world and which succumb in the struggle for existence. In general, this adaptation has been effected by specialization of parts with division of physiological labor, and therefore greater interdependence of parts. But there are numerous instances, especially among parasites, in which the course of evolution has been in the direction of degradation of structure and loss of specialized organs.

The Protozoa with their generalized structure and activities lost the capacity of independent life as soon as they began to form a Metazoon. Each of the generalized cells constituting a Protozoon has all the general functions of the most complete animals; each cell can take in food, digest it, assimilate it; each cell is responsive to changes in the environment, such as changes in light, temperature, density, and chemical composition of the surrounding medium; each cell grows and reproduces itself when the limits of growth have been reached and takes on a new lease of life by the act, an immortal bit of protoplasm. As soon as cells, however, begin to be specialized, the activities are curtailed, so that some become far more evident than in the generalized Protozoa. In the simplest Metazoa, like the freshwater *Hydra*, certain cells become specialized to digest food, but lose their power of movement, while others which come in closer contact with the environment—those covering the exterior of the body—become more resistant to mechanical disturbances and more capable of movement. Each group of cells making up the *Hydra* has lost some of its primitive functions, but has become more alive by association with other specialized cells. With further differentiation, the activities of the different organs become more circumscribed, so that here the power of secretion is lost, there the power of movement, and in another organ irritability to this or that form of stimulus—our finger tips are not sensitive to the perfume of the rose, nor our ears to its color.

The cells which were, in the very simplest types of animals and plants Jack-of-all-trades, can not exist, when specialized, apart from their fellows, which all contribute to the general welfare of the whole. "The eye can not say to the hand, I have no need of thee; or again, the

head to the feet, I have no need of thee." The perfection of the eye is possible only because the needs of this organ are supplied by a great variety of other parts. We can only smile heartily over the naïveté of Empedocles of Agrigentum, who may be called the father of the evolutionary idea, who thought that animals first appeared, not as complete individuals, but as parts of individuals—heads without necks, arms without shoulders, eyes without sockets. We are forced to regard the eye as evolved not as an independent structure, but simply as a part of a whole organism. The needs of the whole organism have been more perfectly met as a result of the specialization of the parts, and not the separate needs of the individual parts. Everywhere an evolution of separate parts in order that the individual organism may be better fitted to its environment has been going on. The brunt of evolution has been borne by the individual and not by the separate organs. Have we any indication in nature of larger organized beings than the individual person, namely communities or colonies which have borne the brunt of evolution and which have evolved at the expense possibly of the individual parts composing them? Is the relation of the individual man to the association comparable to that of an organ or cell to the body?

There is, of course, a certain biological similarity between the individual organs of the body and the body politic, as Thomas Hobbes developed as early as 1651 in his book, "*Leviathan*," and which has been discussed by many others more recently, notably by Herbert Spencer. The organs are masses of material specialized to perform certain functions which extend the life of the whole body and are mutually dependent on each other. The society and the individual body both grow from small beginnings which exhibit no specialization at first, and gradually attain greater and greater specialization and interdependence of parts. The similarity between the organs or cells on the one hand and members of an association on the other is heightened by the fact that there is a certain competition or opposition among the cells just as there is among the citizens of a healthy state. The gymnast's arms grow and become strong while his legs and brain may remain feeble, because the limited amount of nourishment which the body is able to absorb is diverted to the arms. As Ernst Haeckel says in the opening chapter of the "*Riddle of the Universe*,"

We can only arrive at a correct knowledge of the structure and life of the social body, the state, through a scientific knowledge of the structure and life of the individuals who compose it, and the cells of which they are in turn composed.

Interdependence of parts and the exchange of the products of their activity, which has been called the vital circulation, are the criteria of an organism. Just as soon as the products of metabolism of one layer of cells are transferred to another layer, or as soon as food procured by one member is transferred to another, just that soon an organism results.

There are several obvious objections to the idea that the evolution of man has been as a member of a group rather than an individual, or that the relation of a man to the group in evolution has been that of an organ or a cell to the body. The loudest objection, possibly, is on the basis of the ignoring of that preeminently human trait, individual consciousness. Consciousness resides in the individual person and can not be united into a common consciousness resident in the group, but until something more definite is known regarding the nature of consciousness and the occurrence of consciousness in the lower animals, it does not seem possible to take it into consideration on a purely scientific basis.

A further objection to the thesis here presented is that while the organs of the individual body are necessary for the health of the individual, the human association finds no one individual essential for its continued health and prosperity. This objection, however, is not as valid as it appears at first hand because the comparison is invariably made between the individual composed of many highly specialized and stable organs and the association in which biological specialization, in contrast to social specialization, has been carried to a very slight extent. The discrepancy becomes rather negligible when comparison is made between a simpler, only slightly differentiated, individual and the association. Thus, the simple freshwater *Hydra* made up of two layers of cells is so plastic that it may be turned wrong side out by proper manipulation with no serious injury. In other words, although there is mutual dependence between ectoderm and endoderm and both make up the individual *Hydra's* body, both are so plastic that the one may be transformed to the other under proper stimulus. Or again the individual body of one of the higher animals may be subjected to the loss of many of its cells without suffering in any way. Portions of some of the most vitally necessary parts of the body may be removed without causing inconvenience. The idea of an individual organism, then, does not exclude the possibility of a single part's taking over the functions of others and adjusting itself to the new conditions.

As will be shown presently, more perfect adaptation may involve the single individual or it may involve the whole group or colony of individuals. In general, of course, the welfare of the race means the welfare of the individual, and the injury of the individual means just so much loss to the group; but there are some striking exceptions to this rule which may throw some light upon the problem of human evolution. In these cases the fittest which have survived are not the fittest individuals but the fittest colonies, or groups. Fitness may indeed have been achieved at the expense of the individual. The associations which show most clearly the specialization of the individual for the adaptation of the whole group are those of the lowly Hydroids and the highly specialized social bees and ants. The Hydroids are marine animals having

a plant-like appearance which abound usually in shallow water firmly attached to some solid support and covering extensive surfaces often with a furry growth, very closely related to the coral polyps. The colony is made up of countless polyps branching from each other and connected by a continuous system of hollow tubes which adhere to the solid substratum and afford communication between the separate polyps. Generally these are all alike and are able to take in food, to digest it, to throw off powerful stinging organs when stimulated, and to reproduce their kind by sending out buds like themselves, but they are incapable of locomotion. If the colony is divided, each bit is perfectly capable of continuing its existence indefinitely for each polyp is self-sufficient. From time to time, however, a different kind of individual is produced, known as a medusa, which swims away and lays eggs, but is incapable of taking in a particle of food and so is doomed to an early death. Each medusa is dependent upon the polyps for food, and might, if it did not break away from the family, be regarded simply as an organ of the more complex colony. The medusa has evolved for the extension of the colony; its own continued existence is sealed. It is the colony as a whole which has evolved as an adapted organism and not the individual polyp or medusa; just as in the bodies of the higher animals it has been the individual rather than the single organ which has borne the brunt of evolution.

An even more striking illustration of the evolution of a whole colony is afforded by the Portuguese man-o'-war, a near relative of the hydroids. In these animals the colony exhibits a permanently continuous group of individuals of various kinds, but each specialized for a particular function and evidently built on the same general plan and evolved from a less specialized form of polyp. The Portuguese man-o'-war is made up of groups of defensive, nutritive, reproductive, sensory, and locomotor individuals which, unlike the hydroid polyps, have lost their power to live independently but which have been so closely united as to form organs of a single body. At the same time the structure and development of these different polyps shows beyond the shadow of a doubt that they are in reality different forms of the same individual polyps of the Hydroids.

Finally there is the case of the social bees and ants in which the social unity is so definite and perfect that the individuals are incapable of continued life outside of the colony. The queens are usually so specialized as to be incapable of procuring food and rearing young without the assistance of the workers and the workers in turn are so specialized as to be incapable of reproduction, and the drones are indisposed to exert themselves in foraging. "Associated animals," says Darwin, "have thus acquired many remarkable structures, which are of little or no service to the individual, such as pollen-collecting apparatus or the

sting of the worker bee, or the great jaws of the soldier ants." The instincts no less than the structure of the different castes of social insects are distinctly social and can not possibly have come into being except in so far as the colony has evolved as a unit rather than the individual. It is difficult to see how the instinct to sting an intruder could have been developed directly, in view of the fact that in most cases it results fatally to the bee. It is also difficult to see how the instinct to lay up food for months could otherwise have developed in an animal whose normal life is only six weeks. The different castes of ants furnish equal evidences along this same line of the direct evolution of the colony or association and the indirect evolution of the individual. Thus in certain species there are workers and soldiers with jaws and instincts more different than in unrelated species. The workers of one caste never leave the nest but are provided with food by another caste. In all these cases a division of labor is effected which is advantageous to the association of ants as division of labor also is to human beings, enabling a much larger population to be supported on a unit of surface. Complete interdependence of parts and the transfer of material from one part of the association to another indicate a very closely knit association which has been differentiated by an evolutionary process operating through the community, and not through the individual. Although made up of discontinuous masses and lacking permanent form, we must, I think, agree with both Wheeler and Julian Huxley in regarding the swarm as an organism, the product of a complex evolution.

It is perfectly evident, I think, from what I have just shown, that some organisms have developed because of the operation of the evolutionary process upon their individual bodies directly, while others have developed as subordinate parts of the whole group which has evolved as such. Of course, we can not tell why one species should evolve as individuals and another as an aggregate, but that such is the case there can be no doubt.

This shift in the brunt of evolution from the individual to the group in mankind would seem to explain the difference which Huxley made so clear in his essay on "The Struggle for Existence in Human Society."

Society differs from nature in having a definite moral object; whence it comes about that the course shaped by the ethical man—the member of society or citizen—necessarily runs counter to that which the non-ethical man—the primitive savage, or man as a mere member of the animal kingdom—tends to adopt. The latter fights out the struggle for existence to the bitter end like any animal; the former devotes his best energies to the object of setting limits to the struggle.

In order to determine whether man's evolution has been as an individual or as a part of a group, the most important respects in which

man differs from his nearest allies among the beasts must be considered. The most essential differences between man and the apes are the upright position and general defenselessness of the body, the enormously developed intelligence with the power of speech, and a moral sense. In how far these traits are quantitative and not qualitative does not concern us here.

In comparison with the rest of the animals, the relatively weak and defenseless body is striking, especially in view of man's size which renders him unable to retreat into recesses too small for his aggressors, after the fashion of so many of the weak and defenseless gnawing mammals. Man has no defensive armor or heavy integument like the armadillo or elephant, or heavy hair to afford protection against claws and teeth. In fact, the upright position renders man especially vulnerable, although it frees the hands for the wielding of clubs or stones. The smaller base made by the two feet instead of four and the elevation of the center of gravity render man particularly easily overthrown in combat. Besides, some exceedingly vulnerable parts of the body which in the four-footed animals are protected by their position, are left exposed. The whole trunk, with its broad, flat thorax and with the abdominal organs without even a bony chest enclosing them, is especially liable to disabling or fatal injury. In addition, the superficial position of the femoral artery in the groin due to the straightening of the thigh on the hip must have been responsible for much human wastage since prehistoric time. The upright position has likewise rendered the carrying of the fetus particularly hazardous and has put such a strain on the veins of the lower extremities as to make them liable to become varicose. Weak as the human body is against attack, it is almost equally weak in offense; large teeth or strong talons, or limbs of such a shape as to be strong in relation to their weight are not part of the human equipment. Man's strength and survival in competition in nature must be attributed to his intellect and social solidarity. It has only been by man's standing shoulder to shoulder and cooperating for a common purpose that he has gained ascendancy over the beasts and become superlatively intelligent with the power of speech and a moral sense.

The biological approach through the structure, embryology, and fossil remains of the ancestors of the human race do not shed much light on the question whether or not man has evolved as an individual primarily or as a part of an association.

From the psychological avenue of approach more light is thrown upon our problem. The habits of the apes, especially the less specialized ones, those which more nearly represent the common ancestor of the human race and the larger anthropoid apes would seem to indicate a gregarious habit in man's primitive ancestors. It is only the larger

anthropoid apes like the gorilla and the orang in which the habit approaches the solitary, and these forms have very restricted ranges which would seem to indicate that they are disappearing. If man did not evolve as a part of a group, if the group were not the unit which was perfected for the struggle, much of the peculiarly human psychical activity has no meaning. The moral sense and the power of speech, man's most distinctly human possessions, could not easily have come into being apart from a social life in a community of interdependent parts.

Darwin has summed up the evidence regarding man's ancestors as follows:

Judging from the habits of savages and the greater number of *Quadrumana*, primeval man, and even his apelike progenitors, probably lived in society.

Darwin even went so far as to suggest that man sprang from a comparatively small and weak species rather than a powerful one like the gorilla since it would have necessitated the development of social qualities which led him to give and receive aid from his fellow men.

An animal possessing great size and strength and ferocity, and which like the gorilla could defend itself from all enemies, would not perhaps have become social; and this would most effectually have checked the acquirement of the higher mental qualities such as sympathy and the love of his fellows.

The moral sense is a natural and inevitable development from the social instincts and would have been acquired by any animal endowed with well-marked social instincts, including the parental and the filial affections, as soon as the intellectual powers had become as well developed as in man. As Darwin has shown, the social instincts lead an animal to take pleasure in the society of its fellows, to feel a certain amount of sympathy with them and to perform various services for them. Horses and cattle are known to lick and nibble each other in smoothing their coats, and monkeys are prone to help each other to remove vermin from inaccessible parts of their bodies, and in some instances it has been observed that they remove burs and thorns from each other. Then, as soon as the mental faculties had become highly developed, images of all past actions and motives would be passing through the mind of each individual and that feeling of dissatisfaction which invariably results from any unsatisfied instinct, would arise, as often as it was perceived that the enduring social instinct had yielded to some other instinct. And still later after the power of language had been acquired, the common opinion how each one ought to act for the public good would naturally become in a permanent degree the guide to action. In other words, the social instincts are the necessary and sufficient conditions for the evolution of a moral sense.

Alfred Russel Wallace expresses the same truth as follows:

The moral sense in man has developed from the social instincts and depends mainly on the enduring discomfort produced by any action which excites the general disapproval of the tribe. Thus, every act of an individual which is believed to be contrary to the interests of the tribe, excites its unvarying disapprobation and is held to be immoral; while every act, on the other hand, which is, as a rule, beneficial to the tribe, is warmly and constantly approved, and is thus considered to be right and moral. . . . The social instincts are the foundation of the moral sense.

The moral sense has no significance from the point of view of the individual, but only from that of the larger association for

although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men of the same tribe, yet an increase in the number of well-endowed men and advancement in the standard of morality will certainly give an immense advantage to one tribe over another. A tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to aid one another, and to sacrifice themselves for the common good, would be victorious over most other tribes.

Furthermore, no tribe could hold together if murder, robbery, treachery, etc., were common within its limits.

Thus it would seem that the presence of a moral sense in man presupposes a group intimately associated, and more or less interdependent, and that the evolution of a moral sense results in the better adaptation of the group rather than of the individual. One of the few really distinguishing features of the human race, morality, could not have evolved had there not been the necessity for an association of mutually dependent individuals.

Together with a moral sense, the power of speech distinguishes man from the lower animals. And just as the social habit was necessary for the evolution of morality, it was absolutely essential for the development of language. It is scarcely necessary to indicate so obvious a relationship. It has the same function in the community that a nervous system has in an individual body, for, by means of it, different parts of the organism are brought into relationship with each other and a change in one part is transmitted to a widely different part for the accomplishment of some purpose by the larger group. Just as the nervous system unifies or integrates the individual body, language brings the association into harmonious action. As Professor Sayce has said in his "Introduction to the Science of Language," "Language is the creation of society."

Once the human species ceased to be *Homo alalus*, the stimulation of one part of the social organism called forth action in a different part and the whole association was knit more firmly together and *Homo sapiens* appeared on the scene of action. Language also allowed memories to be passed on so that there might be a storage, as it were, of

impressions to be released by the association at a subsequent time. Man acquired the power of directing actions within the association at a distance both of time and space and these two troublesome conceptions were to a certain extent overcome. As soon as men had to live together, and found that they could by making signs direct each other's actions, there was immediately an immense step made forward in the arrangement of propositions within our brain, as Professor Clifford has expressed it.

This very brief consideration of the way humanity may have evolved shows how fundamental the association of human individuals has been in that evolution, and how fundamentally unified a group of men must have been in order to survive. What constitutes a human association I have not discussed. It might be a single family like the Swiss Family Robinson, or a tribe, or a nation, or the entire human species. The limits can be determined only on the basis of interdependence and the so-called vital circulation. In the infancy of the human race it must have been the troupe occupying a restricted region between the members of which some division of labor and mutual aid must have been practised, at least to the extent that sentries to warn of approaching danger and signal the rest of the association may have been set, or one member may have acted as leader and directed the flight from the enemy or spied out food and shelter. However limited the association may have been in the beginning, it is needless to say that now, thanks to the greater intelligence of the human species, the association is wider as measured by the much greater interdependence and much more general vital circulation. When the failure of the wheat crop in India or floods in China raises the cost of living all over the world, and the murder of the Austrian Archduke Ferdinand in the capital of Bosnia sets men murdering each other not only all over Europe but in the heart of Africa and on the shores of Asia, it is evident that the vital circulation now embraces a considerable group.